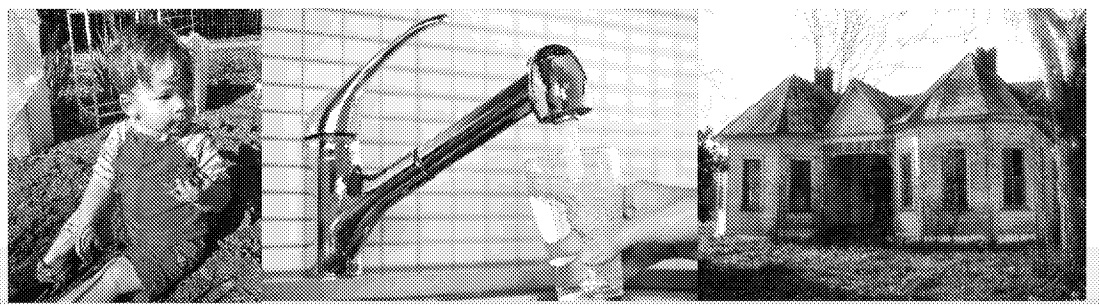
Update on Federal Lead Action Plan, Research Goal 4 and EPA/ORD's Lead (Pb) Science

3/27/19 presentation to EPA STPC
EPA/ORD Valerie Zartarian, Ph.D.



GOAL 4: SUPPORT AND CONDUCT CRITICAL RESEARCH TO INFORM EFFORTS TO REDUCE LEAD EXPOSURES AND RELATED HEALTH IMPACTS

Prioritize & address critical research and data needs to inform lead policies & guide decisions

Action 1. Enhance and apply data and tools (e.g., models or approaches) and determine the key drivers of blood lead levels from multimedia exposures to inform lead regulatory decisions and site assessments.

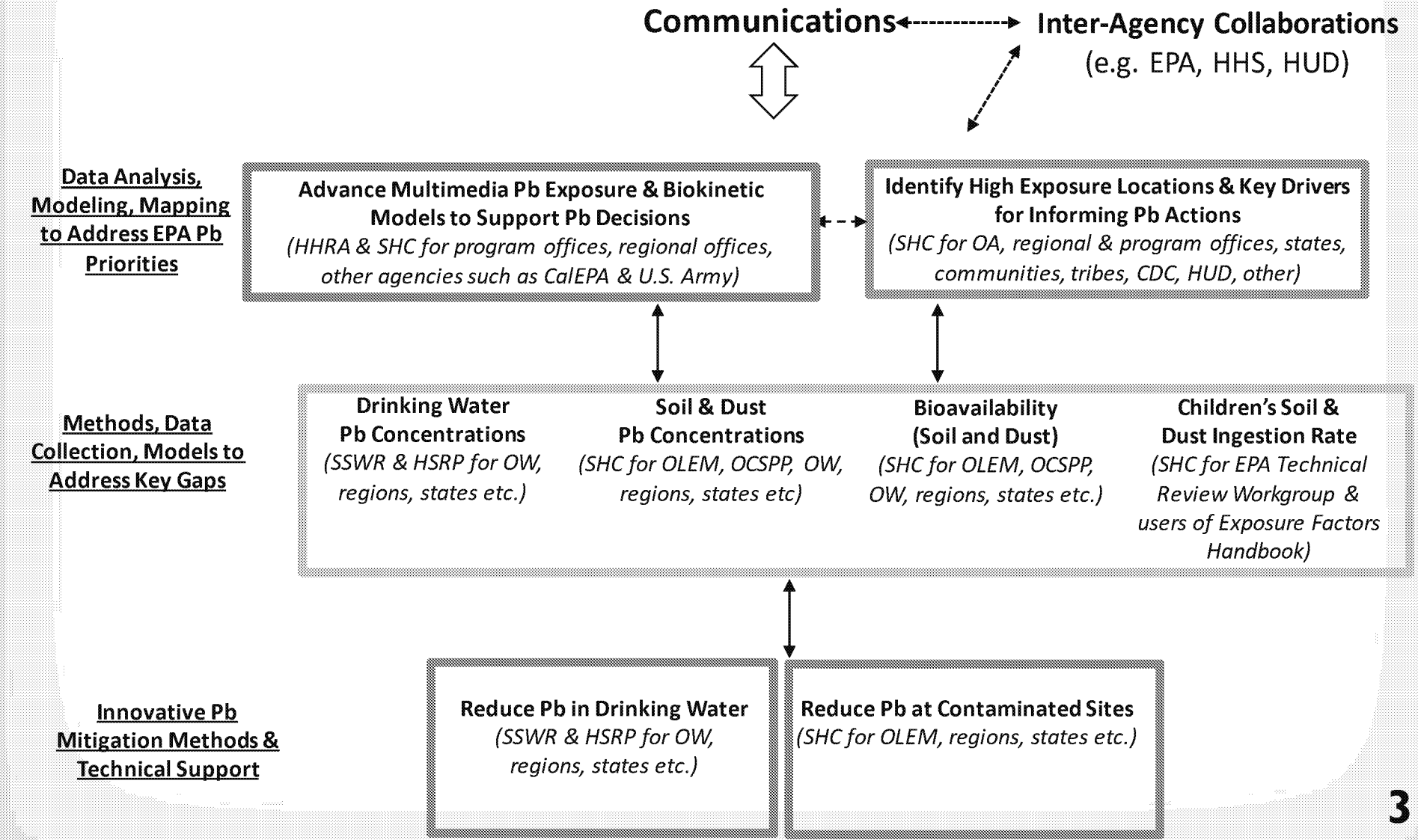
Action 2. Generate data, maps and mapping tools to identify high exposure communities or locations and disparities for prioritization efforts to reduce children's blood lead levels.

Action 3. Generate data to address critical gaps for reducing uncertainty in lead modeling and mapping for exposure/risk analyses and for estimating population-wide health benefits of actions to reduce lead exposures.

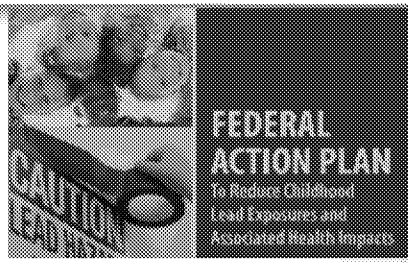
Action 4. Identify approaches to prevent, mitigate, and communicate about lead exposures and risks in exposed communities.

Action 5. Evaluate the effectiveness of actions (e.g., interventions, programs, policies, enforcement) to prevent lead exposure, mitigate health effects and communicate on lead exposures/risks.

ORD Pb Science Related to Goal 4 Actions (details in bowling chart)



Interagency Pb Research Workshop co-led by ORD, NIEHS, CDC, HUD



DRAFT AGENDA IN DEVELOPMENT:

When/Where: December 4-5, 2019 Bethesda, MD NIH facility

Goal: Convene federal [& possibly non-federal] partners to communicate progress and prioritize next steps to leverage, coordinate, further implement FLAP Goal 4 Actions.

Objectives: (1) Share information summarizing state-of-the-science and current efforts; (2) highlight/prioritize critical research needs; (3) propose set of concrete suggestions of next steps and timelines for each of the 5 Goal 4 actions.

Audience (invitation-only): Federal policy makers, regulators, scientific staff from participating agencies in the President's Task Force; estimated ~200+ participants.

WILL INCLUDE EPA & OTHER FEDERAL AGENCY PRESENTATIONS

Screenshot Section of ORD Pb Bowling Chart

Technical support in red

Topic/Action/Deliverable/Milestone (POC) {National Program} [product]	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 JAN	FEB E	FEB M	FEB L	MAR E	MAR M	MAR L	APR E	APR M	APR L	MAY E	MAY M	MAY L	JUN E	JUN M	JUN L	JUL E	JUL M	JUL L	JUL E
Data Analysis, Modeling, Mapping																								
Action 1. Identify High Exposure Locations and Key Drivers (Zartarian) {SHC}																								
1.1 Data & maps to identify high exposure locations in Michigan (Xue) [data]						Done																		
1.2 Technical support to Regions to identify high Pb exposure locations (Zartarian) [data, maps]																								
1.3 Advance interagency collaboration and data sharing (Zartarian) [pub, conference]																								
1.4 Identify key drivers & data gaps of BLLs for regions & states (Tornero/Xue) [pub]																								
Action 2. Advance Pb Exposure and Biokinetic Models (Brown/Xue/Flowers) {HHRA, SHC}																								
2.1 Release of final All-Ages Lead Model, AALM (Brown) [model]																								
2.2 Evaluation of IEUBK 2.0 BLL predictions w/ Idaho dataset (Brown) [pub]																								
2.3 SHEDS-IEUBK results for OW/OGWDW LCR Benefits Analysis (Xue/Stanek) [data]			Done																					
2.4 SHEDS-IEUBK results for OW/OGWDW LCR Benefits Analysis (Xue/Stanek) [pub]																								
2.5 SHEDS-IEUBK results for Pb Hazard Rule to OCSPP (Xue/Zartarian) [data]							Done																	
2.6 Workshop: ORD Pb Modeling (Flowers) [workshop]																								
Methods, Data Collection, Model to Address Key Gaps																								
Action 3. Drinking Water Pb Concentrations (Murray) {SSWR, HSRP}																								
3.1 Analysis of Flint point of use filters (Lytle, Schock) [pub]						Done																		
3.2 Delivery of prototype lead sampling device (Lytle) [prototype device]																								
3.3 Sampling device for lead measurement (Lytle) [pub, device]																								
3.4 Sampling for Pb service line identification (Lytle) [pubs]																								
3.5 Development of premise plumbing Pb model (Burkhardt) [model, pubs]																								
3.6 Extramural research grants mid-term progress review (Hahn) [conference]																								
Action 4. Soil and Dust Pb Concentrations (Bradham) {SHC}																								
4.1 HUD/AHHSII Pb conc. in DW, soil, dust samples for TRW/models (Bradham) [data]																								
4.2 Analysis of HUD/AHHSII Pb conc. in DW, soil, dust samples (Bradham) [pub]																								

● ● ● (10 Actions)

Extra Slides for Questions:

Examples of ORD Pb Science supporting FLAP Goal 4 Action

Action 1: Advancing Pb Exposure and Biokinetic Models

Need: Science advancements, coordination needed for Pb models used in decisions

Stakeholders: EPA Program Offices and others

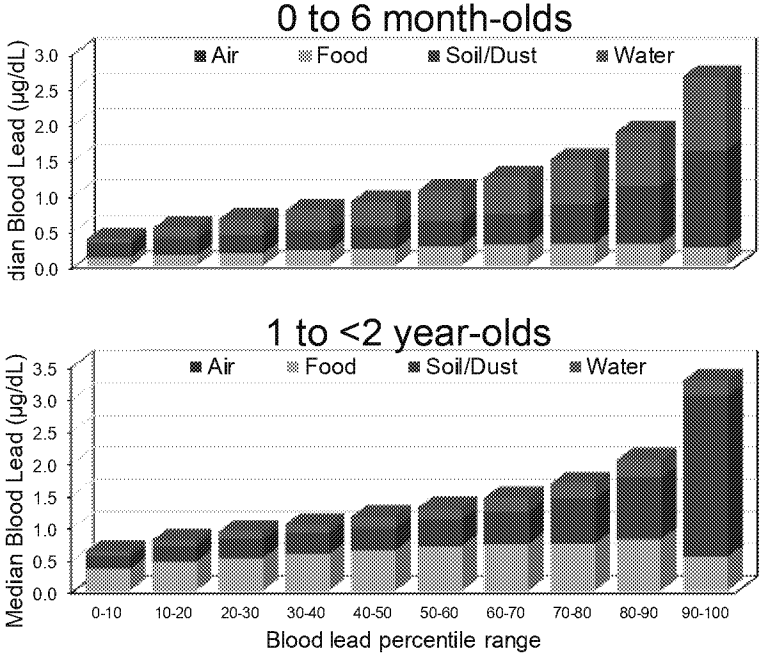
Approach:

- Apply SHEDS-IEUBK modeling for analyses to support technical assistance requests from EPA program offices
  - LCR benefits analysis for OW/OGWDW
  - Lead Hazard Rule for OCSPP
- Evaluate IEUBK 2.0 model using Idaho dataset; applications requested by stakeholders
- SAB peer review of All-Ages Lead Model (AALM)
- Explore coupling SHEDS-Multimedia with AALM
- Conduct ORD Pb modeling coordination workshop

Planned Products:

- Peer-reviewed, published Pb models/applications to advance science and inform decisions

Estimated Contribution of Exposure Pathways to BLL (national scale)



V.G. Zartarian, J. Xue, R. Tornero-Velez, J. Brown, 2017, *Environmental Health Perspectives*, DOI number: 10.1289/EHP1605.

Action 2: Identifying High Pb Exposure Locations & Key Drivers

Need: Science-based approaches are needed for identifying Pb focus communities & key factors to inform decisions, drive action, and focus data/research efforts

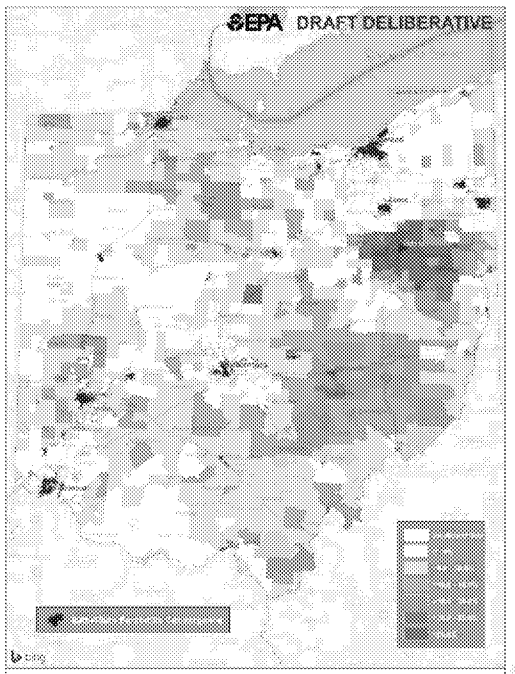
Stakeholders: OA, Region 5, Region 7, other regional & program offices, states (e.g. ASTHO/ECOS), communities, tribes, CDC/ATSDR, HUD, public health community

Approach:

- Compile, statistically analyze, visualize Pb indices/models & measured BLL data: convergences and divergences
- Collaborate with partners to analyze available environmental data where BLLs, indices diverge at upper %iles
- Apply models to analyze relative contribution to BLLs from exposure pathways (depends on data)

Planned Products:

- Data analyses to address technical assistance requests by Region 5 and others to identify high exposure locations
- 2019 NEHA conference session with EPA, CDC, HUD
- Presentations, publications on approaches and results



Ohio Census Tracts - OH Department of Health (2013):
Observed Probability of Children Tested Having a
BLL Greater Than or Equal to 5 ug/dL (2007-2011 BLL Data)
and
Schultz et al., 2017 & EJSCREEN Pb Paint EJ Index
80th-100th State Percentile Convergence

Action 3: Generating Data to Address Critical Data Gaps

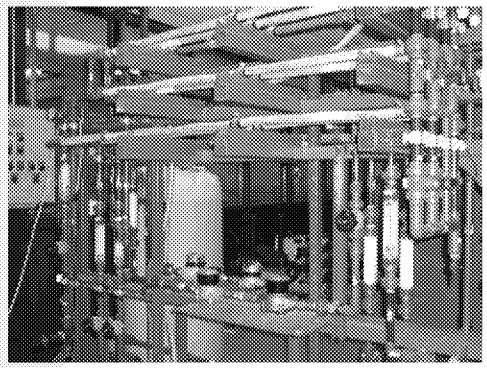
- **Drinking water**
  - Sampling techniques and strategies to identify and characterize Pb in plumbing materials; premise plumbing and other Pb fate & transport modeling; evaluation of drinking water quality sampling technologies; testing and evaluation of treatment processes; guidance on optimizing Pb mitigation strategies; sensors to indicate contamination

- **Soil/dust concentrations**
  - Leveraging HUD American Healthy Homes Survey II data collection

- **Bioavailability of soil and sediments**
  - Reviewing literature and leveraging AHHSII samples to evaluate bioavailability of Pb particulate/pipe scale and urban household dusts
  - Developing methods to determine bioavailability of Pb in soils to support cost effective remediation of contaminated sites

- **Soil/dust ingestion rates**
  - Leveraging existing datasets to calculate estimates for young children
  - Advancing research to identify a novel tracer for soil/dust ingestion
  - Discussing with partners possible targeted field study

Action 4. Innovative Mitigation Methods & Tech Support for Reducing Pb in D.W.



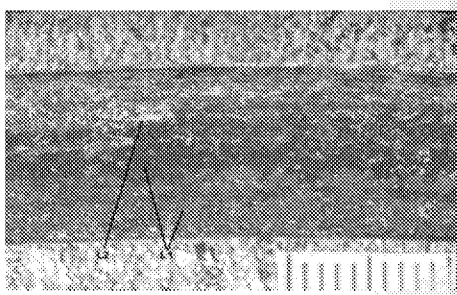
Need: Communities need technical assistance related to corrosion control and action level exceedances.

Stakeholders: OW, Regions, states, tribes, utilities, communities

Approach: Diagnosing distribution system issues; performing scale analyses, analyzing sampling data, recommending corrosion control treatment approaches

Results:

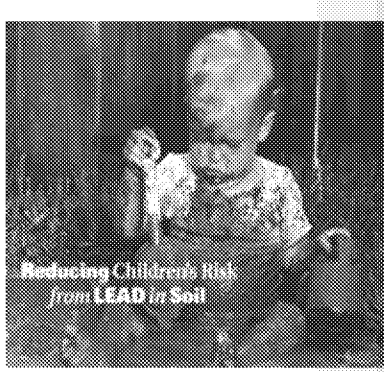
- Assessing effectiveness of corrosion control treatment through pipe scale analysis (e.g., Green Bay, Kenosha, & Cudahy, WI; Newark, NJ; Fall River, MA; Providence, RI; Flint, MI)
- Review of corrosion control plans and providing recommendations (e.g., Sebring, OH; Denver, CO; Providence, RI; Pittsburgh, PA; Parchment, MI; Region 1; Portland, OR)
- Researching methods to improve the ability to identify lead service lines (LSL) (e.g., Flint, MI; Galesburg, IL)



Impact: States and water systems across U.S. have improved drinking water quality.

Action 5. Innovative Mitigation Methods & Tech. Support for Reducing Pb at Contaminated Sites

Need: Site specific Pb bioaccessibility is a critical factor in setting clean up levels and determining cost of cleanup. Established methods to estimate this have been very expensive and time consuming.



Stakeholders: Regions, program offices (OLEM), states, communities

Approach:

- Developing/applying innovative lead mitigation methods at contaminated sites (e.g., bioavailability/bioaccessibility)
- Speciation & microbial factors influencing Pb bioavailability in soils and sediments
- Methods using plumbojarosite for binding Pb in soil in situ
- Omaha Pb study – assessing efficacy of soil remediation

Impact: EPA's use of site-specific values for Pb risk assessments protects public health in communities across the U.S. and saves hundreds of millions of $ in cleanup costs.